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The effect of preoperative education on opioid consumption in patients undergoing arthroscopic rotator cuff repair: a prospective, randomized clinical trial—2-year follow-up

Quincy Cheesman, DO[a], Michael DeFrance, DO[b], James Stenson, DO[b], Danielle Weekes, MD[a], Jenna Feldman, DO[c], Joseph Abboud, MD[a], Luke Austin, MD[a,*]

[a]*Rothman Orthopaedic Institute at Thomas Jefferson University, Philadelphia, PA, USA*
[b]*Rowan University School of Osteopathic Medicine, Stratford, NJ, USA*
[c]*Inspira Health Orthopaedics, Vineland, NJ, USA*

Background: With the recent opioid epidemic in the United States, measures by both government and medical providers are being taken to decrease the opioid dependence rate. Different methods have been proposed, including patient education and multimodal pain therapies. The purpose of this study was to determine whether preoperative opioid education reduces the risk of opioid dependence at 2 years following arthroscopic rotator cuff repair (ARCR).

Methods: This study was a 2-year follow-up of the 2018 Neer Award study that demonstrated the use of preoperative opioid education as a means to reduce postoperative opioid consumption after ARCR at 3-month follow-up. This was a prospective, single-center, single-blinded, parallel-group, 2-arm, randomized clinical trial with a 1:1 allocation ratio. To study the effect of preoperative opioid education on opioid dependence at 2 years, we randomized patients into 2 cohorts, a study cohort and a control cohort. Data were obtained with a review of prescription data–monitoring software and a patient telephone interview.

Results: Opioid education ($P = .03$; odds ratio, 0.37; 95% confidence interval, 0.14-0.90) was found to be an independent factor that is protective against opioid dependence. Study patients had a lower rate of opioid dependence (11.4%, 8 of 50) than control patients (25.7%, 18 of 50) ($P = .05$). Significantly fewer prescriptions were filled by study patients (mean, 2.9) than by control patients (mean, 6.3) ($P = .03$). Additionally, fewer pills were consumed by study patients (median, 60; interquartile range [IQR], 30, 132) than by control patients (median, 120; IQR, 30, 340) ($P = .10$). Finally, fewer morphine milligram equivalents were consumed by study patients (median, 375; IQR, 199, 1496) than by control patients (median, 725; IQR, 150, 2190) ($P = .27$).

Conclusion: Our study found that patients who were preoperatively educated on opioid use were less likely to become opioid dependent at 2-year follow-up. Therefore, we demonstrated that opioid education does impart significant long-term benefits to patients undergoing ARCR.

Level of evidence: Level I; Randomized Controlled Trial; Treatment Study

Keywords: Elective shoulder surgery; arthroscopic rotator cuff repair; opioid epidemic; opioid dependence; opioid abuse; preoperative opioid education

This study was reviewed and approved by the Institutional Review Board at Thomas Jefferson University (study no. 15D.407).

*Reprint requests: Luke Austin, MD, Rothman Orthopaedic Institute, 925 Chestnut St, Philadelphia, PA 19107, USA.
E-mail address: Luke.austin@rothmanortho.com (L. Austin).

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The Centers for Disease Control and Prevention has recognized and initiated efforts to better track and understand the growing opioid overdose epidemic in the United States. It reported that >70,000 persons died of drug overdoses in 2017, making drug overdose a leading cause of injury-related death in the United States. Of those deaths, approximately 68% involved a prescription or illicit opioid.[3,12] Owing to these alarming statistics, measures by both government and medical providers are being taken to decrease the opioid dependence rate.[6,9,10]

A review of the literature reveals an unacceptably high rate of opioid dependence following elective arthroscopic rotator cuff repair (ARCR).[2,5,8,14,16,17,20] Therefore, the role of orthopedic surgeons is critical in fighting this epidemic. Different methods have been proposed, including patient education and multimodal pain therapies.[4,18] Syed et al[19] evaluated the effect of preoperative education on opioid consumption in patients undergoing ARCR, revealing that preoperative opioid education was associated with decreased opioid consumption at 3-month follow-up. Our study follows up the same cohort of patients for a minimum period of 2 years. To our knowledge, no prospective studies have evaluated the effect of preoperative education on opioid consumption in patients undergoing ARCR at mid-term follow-up.

The purpose of this study was to determine whether preoperative opioid education reduces the risk of opioid dependence at 2 years following ARCR. We hypothesized that preoperative opioid education would decrease the risk of opioid dependence at 2 years.

Materials and methods

This was a 2-year follow-up on the 2018 Neer Award study whose primary purpose was to determine whether preoperative opioid education reduces postoperative opioid consumption after ARCR at 3-month follow-up.[19] For the purpose of this study, we report 2-year follow-up results. This level 1 treatment study was a prospective, single-center, single-blinded, 2-arm, parallel-group, randomized clinical trial with a 1:1 allocation ratio that took place at a single institution from August 2015 to December 2019. Patients who underwent ARCR from August 2015 to December 2016 performed by 1 of 7 fellowship-trained orthopedic surgeons at our institution were identified. Eligible participants were all adults aged $\geq$ 18 years in whom ARCR was clinically indicated. The exclusion criteria were irreparable rotator cuff tears, a history of gastrointestinal ailments, allergies to the study medication, previous rotator cuff repair on the injured shoulder, or any evidence of glenohumeral arthritis. All patients were blinded to the purpose of the study at the time of randomization and education administration; they were told that the study purpose was to characterize pain control after ARCR.

A total of 140 patients were consented for the study. Following simple randomization procedures (computer-generated random number scheme), patients were randomly assigned to the study group or control group by an investigator with no clinical involvement in the trial. Additionally, the surgeon performing ARCR was blinded to the patient's randomization assignment group. The study cohort received formal opioid education involving recommended postoperative opioid use, side effects, dependence, and addiction. They also watched a 2-minute computer-based presentation concerning opioid abuse and its consequences (Video 1). In addition, they were provided with a paper outline for review (Supplementary Appendixes S1 and S2), highlighting the most important points of the presentation. The control cohort received standard preoperative education followed by a discussion of risks and benefits. No formal education on opioid use, dependence, and addiction was provided.[5]

Following establishment of patient cohorts, prescription data–monitoring software was used to identify patients being prescribed controlled substances, specifically opioid pain medications including tramadol. Pursuant to state law, all pharmacies in New Jersey and Pennsylvania are required to submit weekly prescription data on controlled dangerous substances and human growth hormone. Our search included the states of New Jersey and Pennsylvania given the proximity of our patient population. The prescription data–monitoring software provided all controlled prescriptions written by any physician within 2 years of the search date. The database was searched to identify patients using their first name, surname, and date of birth.

All patients receiving opioid pain medications within 2 years of the search date—or after their surgical date—were identified. The initial opioid prescription for oxycodone written by the operative surgeon was standardized in the initial study so that all patients received 50 tablets of oxycodone (10 mg)–acetaminophen (325 mg). Any additional opioid prescriptions received by patients, including codeine, hydrocodone, hydromorphone, morphine, oxycodone, and tramadol, were recorded. Morphine milligram equivalents (MMEs) were calculated to standardize the variety of opioid medications that patients were prescribed.

After prescription data–monitoring information was tabulated, all 140 patients were contacted via telephone and queried on the interval history since their ARCR. This included additional surgical procedures, self-reported current opioid use, current shoulder pain, and Single Assessment Numeric Evaluation (SANE) assessment of the operative shoulder.

With collection of all data from the prescription data–monitoring software and patient-reported telephone questionnaire, patients were divided into groups to better define appropriate postoperative opioid use vs. opioid dependence following ARCR. Currently, there are not any established guidelines defining this; thus, we established our own definitions in relation to this study. Acute postoperative opioid use was defined as 0-2 postoperative opioid prescriptions within 6 months. This was inclusive of the original prescription given by the operative surgeon. Moderate postoperative opioid use was defined as 3-5 postoperative opioid prescriptions from the date of surgery to the date the prescription data–monitoring software was checked. Opioid dependence was defined as $\geq$6 opioid prescriptions from the date of surgery to the date the prescription data–monitoring software was checked.

The primary outcome measure of this study was to determine whether preoperative opioid education reduces the risk of opioid dependence at 2-year follow-up after ARCR. Secondary outcome measures included the overall rate of opioid dependence following ARCR, risk factors for opioid dependence, and patient-reported outcomes of the operative shoulder (visual analog scale [VAS] pain score and SANE score). The VAS pain score is a well-established, reliable, valid tool to assess pain.[1] The SANE score has been shown to correlate positively with the American Shoulder and Elbow Surgeons score postoperatively in patients undergoing ARCR.[15]

Statistical methods

A statistical analysis was run to analyze the primary outcome of whether preoperative opioid education reduces the risk of opioid dependence at 2 years. An a priori power analysis was performed to detect a difference in opioid dependence between the study and control cohorts with an effect size of 0.5 using an α of .05 and β of .80. This analysis determined that a sample size of 128 patients (64 in each group) was needed.

Following data collection, a bivariate logistic regression was run to determine any independent factors for opioid dependence. Additionally, a bivariate analysis was conducted to evaluate the effect of patient education on opioid dependence by comparing patients in the control cohort vs. study cohort. This analysis was performed for the overall cohort (prior opioid users and opioid-naive patients), opioid-naive cohort only, and prior–opioid use cohort only. Another bivariate analysis was conducted to evaluate the effect of prior opioid use on dependence by comparing the prior–opioid use cohort with the opioid-naive cohort. Finally, patient-reported postoperative outcomes (SANE and VAS scores) of the operative shoulder were analyzed to determine any differences within the various subcategorized groups (study cohort with prior opioid use, study cohort of opioid-naive patients, control cohort with prior opioid use, and control cohort of opioid-naive patients).

Continuous data are presented as either mean for parametric data or median [first quartile, third quartile] for nonparametric data. To calculate *P* values, *t* tests were used for parametric data whereas the Mann-Whitney *U* test was used for nonparametric tests. Categorical data are presented as cell count (percentage of total count), and the *P* values were calculated by either the χ^2 test or Fisher exact test. All statistical analyses were performed using R Studio (version 3.5.1; R Foundation for Statistical Computing, Vienna, Austria).[13]

Results

Patient enrollment, randomization, and demographic characteristics

A total of 140 patients were followed up for a minimum of 2 years from the date of ARCR. The dates of ARCR procedures and recruitment for this randomized controlled trial were from August 2015 to December 2016, at which point, as estimated by the a priori power analysis, a sufficient sample size was reached to achieve adequate power. Dates of follow-up continued to December 2019 to allow sufficient follow-up data collection of all patients participating in the study. The average length of follow-up for all patients was 3 years (range, 2.7-3.6 years).

Patients were randomized with a computer-generated scheme into the study group or control group: 50% of patients (70 of 140) were randomized into the study group, whereas the remaining 50% (70 of 140) were randomized into the control group. A flow diagram of the enrollment process is provided in Figure 1. Table I presents baseline demographic characteristics and clinical characteristics for each group. There were no significant differences in any preoperative parameter between the 2 groups.

Postoperative opioid use breakdown

Patients were allocated into postoperative opioid use cohorts to better define appropriate postoperative opioid use vs. opioid dependence following ARCR. This allocation yielded 72.9% of patients (102 of 140) to the acute postoperative opioid use cohort, 8.6% of patients (12 of 140) to the moderate postoperative opioid use cohort, and 18.6% of patients (26 of 140) to the opioid dependence cohort. Therefore, the rate of opioid dependence following ARCR in this study was 18.6% (26 of 140).

Independent risk factors for opioid dependence

A bivariate logistic regression analysis was performed to identify any independent risk factors for opioid dependence. Prior opioid education ($P = .03$; odds ratio [OR], 0.37; 95% confidence interval [CI], 0.14-0.90) was found to be an independent factor that is protective against opioid dependence. On the other hand, prior opioid use ($P < .001$; OR, 7.01; 95% CI, 2.84-18.17), increased MMEs consumed ($P < .001$; OR, 1.003; 95% CI, 1.002-1.004), increased number of pills consumed ($P = .001$; OR, 1.03; 95% CI, 1.02-1.06), and increased VAS pain score ($P = .005$; OR, 1.30; 95% CI, 1.08-1.57) were all found to be independent risk factors for opioid dependence. Table II further details the analysis with significance set at $P < .05$.

Effect of patient education on opioid use by comparing study cohort vs. control cohort in overall patient population (opioid-naive patients and prior opioid users)

Study patients had a lower rate of opioid dependence (11.4%, 8 of 50) in comparison to control patients (25.7%, 18 of 50) ($P = .05$). Significantly fewer prescriptions were filled by study patients (mean, 2.9) than by control patients (mean, 6.3) ($P = .03$). Additionally, fewer pills were consumed by study patients (median, 60; interquartile range [IQR], 30, 132) than by control patients (median, 120; IQR, 30, 340) ($P = .10$). Finally, fewer MMEs were consumed by study patients (median, 375; IQR, 199, 1496) than by control patients (median, 725; IQR, 150, 2190) ($P = .27$). Table III further summarizes and provides a means of comparison of these data.

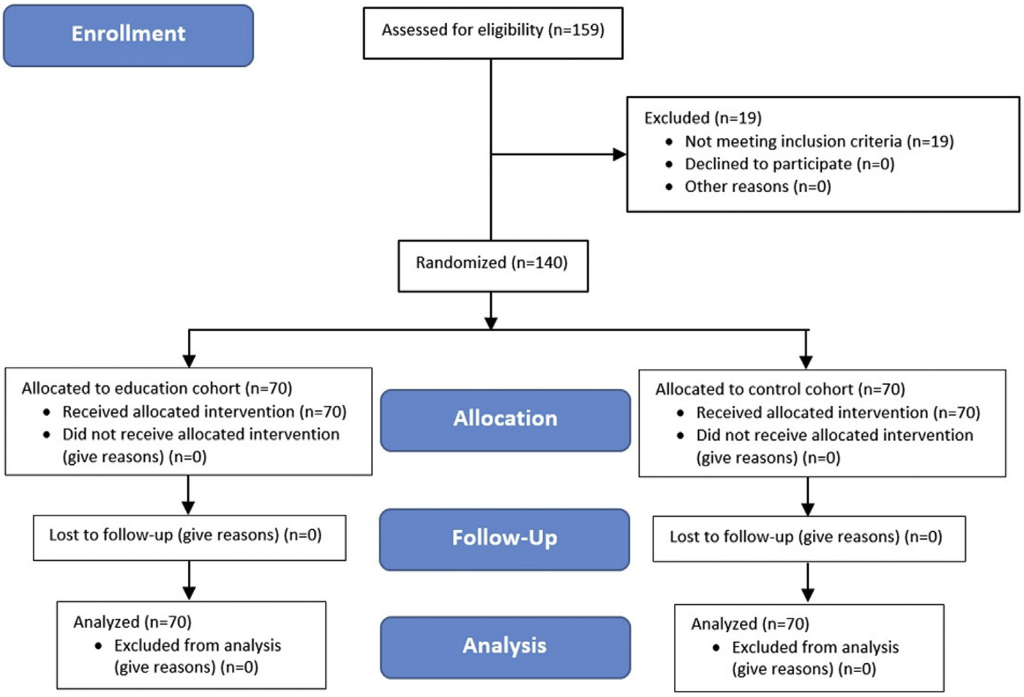

Figure 1 Flow diagram of study participants.

Table I Preoperative demographic characteristics

Variable	Control group (n = 70)	Study group (n = 70)	*P* value
Age, yr	57.5 ± 9.18	58.6 ± 9.12	.50
Male sex, n (%)	47 (67.1)	48 (68.6)	>.999
BMI, kg/m^2	29.0 ± 4.9	30.2 ± 6.3	.35
Smoking, n (%)	14 (20.0)	6 (8.6)	.09
High blood pressure, n (%)	36 (51.4)	41 (58.6)	.38
Diabetes, n (%)	11 (15.7)	7 (10.0)	.49
Anxiety and/or depression, n (%)	13 (18.6)	14 (20.0)	.93
Risk according to opioid risk tool, n (%)			.57
Low	62 (88.6)	60 (85.7)	
Moderate	5 (7.1)	4 (5.7)	
High	3 (4.3)	6 (8.6)	
Prior opioid use, n (%)	21 (30.0)	16 (22.9)	.41
Insurance, n (%)			.44
Medicare	13 (18.6)	13 (18.6)	
Private	46 (65.7)	50 (71.4)	
Workers' compensation	11 (15.7)	7 (10.0)	

BMI, body mass index.
Continuous data are presented as mean (standard deviation) for parametric data. To calculate *P* values, *t* tests were used for parametric data. Categorical data are presented as cell count (percentage of total count), and the *P* values were calculated by χ^2 tests. Significance was set at $P < .05$.

Effect of patient education on opioid use by comparing study cohort vs. control cohort among opioid-naive patients only

Among opioid-naive patients only, study patients were significantly less likely to become opioid dependent (3.7%, 2 of 54) than control patients (16.7%, 8 of 48) ($P = .04$). Fewer prescriptions were filled by study patients (mean, 1.2) than by control patients (mean, 3.4) ($P = .06$). Additionally, fewer pills were consumed by study patients (median, 50; IQR, 28, 80) than by control patients (median, 100; IQR, 30, 233) ($P = .09$). Finally, fewer MMEs were

Table II Bivariate regression assessing risk factors for opioid dependence

Variable compared to dependence	Odds ratio	*P* value	95% CI	
			Lower	Upper
Female sex	1.41	.446	0.57	3.38
Smoker	1.11	.859	0.30	3.40
BMI	0.98	.691	0.91	1.06
Age	0.98	.340	0.93	1.02
Workers' compensation	1.41	.576	0.37	4.44
High blood pressure	1.64	.277	0.69	4.13
Diabetes	1.81	.304	0.54	5.40
Anxiety and/or depression	1.69	.297	0.60	4.45
Educated	0.37	.034	0.14	0.90
Prior opioid use	7.01	<.001	2.84	18.17
Opioid risk tool score	1.07	.125	0.98	1.18
2-yr morphine equivalent units	1.003	<.001	1.002	1.004
2-yr No. of pills consumed	1.03	.001	1.02	1.06
VAS pain score	1.30	.005	1.08	1.57
SANE score	0.99	.333	0.97	1.01

CI, confidence interval; *BMI*, body mass index; *VAS*, visual analog scale; *SANE*, Single Assessment Numeric Evaluation.
Significance set at $P < .05$.

consumed by study patients (median, 375; IQR, 165, 675) than by control patients (median, 535; IQR, 150, 1871) ($P = .42$). Table III further summarizes and provides a means of comparison of these data.

Effect of patient education on opioid use by comparing study cohort vs. control cohort among prior opioid users only

Among patients who were prior opioid users, study patients had a lower rate of opioid dependence (37.5%, 6 of 16) than control patients (47.6%, 10 of 21) ($P = .78$). Fewer prescriptions were filled by study patients (mean, 8.9) than by control patients (mean, 13.2) ($P = .56$). Additionally, fewer pills were consumed by study patients (median, 270; IQR, 105, 1531) than by control patients (median, 498; IQR, 45, 798) ($P = .54$). Finally, fewer MMEs were consumed by study patients (median, 1612; IQR, 626, 11,480) than by control patients (median, 2475; IQR, 325, 4650) ($P = .57$). Table III further summarizes and provides a means of comparison of these data.

Effect of prior opioid use on opioid dependence by comparing opioid-naive patients and prior opioid users

Prior opioid users were significantly more likely to be opioid dependent (43.2%, 16 of 37) than opioid-naive patients (9.8%, 10 of 102) ($P < .001$). Significantly more prescriptions were filled by prior opioid users (mean, 11.3) than by opioid-naive patients (mean, 2.2) ($P = .001$). Additionally, significantly more pills were consumed by prior opioid users (median, 300; IQR, 60, 970) than by opioid-naive patients (median, 60; IQR, 30, 160) ($P = .001$). Finally, significantly more MMEs were consumed by prior opioid users (median, 1650; IQR, 450, 5592) than by opioid-naive patients (median, 375; IQR, 150, 1200) ($P = .003$). Table III further summarizes and provides a means of comparison of these data.

Patient questionnaires

Of the 140 patients contacted, 75.0% (105 of 140) completed the questionnaire at a minimum of 2 years following ARCR. On the basis of patient questionnaire responses, 22 of 105 patients indicated they were still using opioid pain medications, although only 10% (10 of 105) reported daily use.

In addition, we compared long-term shoulder function and pain between study patients and control patients with SANE and VAS assessment, respectively. The study cohort yielded a lower average SANE score (mean, 80.7) than the control group (mean, 83.7) ($P = .46$). On assessment of pain with the VAS tool, the study cohort had a lower mean VAS pain score (mean, 1.53) than the control cohort (mean, 1.70) ($P = .94$).

SANE scores were then subcategorized into 4 groups for further assessment: study patients with prior opioid use (mean, 74.8), study patients who were opioid naive (mean, 83.1), control patients with prior opioid use (mean, 68.2), and control patients who were opioid naive (mean, 90.1). A multiple-comparison test yielded an overall *P* value of .011,

Table III Summary of statistical analysis for each cohort

	Opioid dependence, %	No. of prescriptions filled	No. of pills consumed	No. of MMEs consumed
Overall cohort				
Study cohort	11.40	2.9	60 [30, 132]	375 [199, 1496]
Control cohort	25.70	6.3	120 [30, 340]	725 [150, 2190]
P value	.05	.03	.1	.27
Opioid naive patient cohort				
Study cohort	3.70	1.2	50 [28, 80]	375 [165, 675]
Control cohort	16.70	3.4	100 [30, 233]	535 [150, 1871]
P value	.04	.06	.09	.42
Prior opioid use patient cohort				
Study cohort	37.50	8.9	270 [105, 1531]	1612 [626, 11,480]
Control cohort	47.60	13.2	498 [45, 798]	2475 [325, 4650]
P value	.78	.56	.54	.57
Overall cohort according to prior opioid use				
Prior opioid use cohort	43.20	11.3	300 [60, 970]	1650 [450, 5592]
Opioid-naive cohort	9.80	2.2	60 [30, 160]	375 [150, 1200]
P value	$<$.001	.001	.001	.003

MME, morphine milligram equivalent.
Continuous data are presented as mean (standard deviation) for parametric data. To calculate *P* values, *t* tests were used for parametric data. Categorical data are presented as cell count (percentage of total count), and the *P* values were calculated by χ^2 tests. Significance was set at $P < .05$.

with comparisons between control patients with prior opioid use and control patients who were opioid naive pulling the most significance (Table IV).

VAS scores were also further subcategorized into 4 groups for additional assessment: study patients with prior opioid use (mean, 1.58), study patients who were opioid naive (mean, 1.51), control patients with prior opioid use (mean, 3.44), and control patients who were opioid naive (mean, 1.08). A multiple-comparison test yielded an overall *P* value of .011, with comparisons between the study cohort without prior opioid use and the control cohort with prior opioid use, as well as between the control cohort with prior opioid use and the control cohort without prior opioid use, pulling the most significance (Table IV).

Discussion

This study was designed to ascertain whether preoperative opioid education decreases the risk of opioid dependence 2 years following ARCR. We hypothesized that preoperative opioid education would decrease the risk of opioid dependence at 2 years. Our study found that patients who were educated about opioid use preoperatively were less likely to become opioid dependent, filled fewer opioid prescriptions, and consumed fewer opioid pills and MMEs. Our study demonstrated that opioid education does impart significant long-term benefits to patients undergoing ARCR. This benefit is seen among all patients (prior opioid users and opioid-naive patients); however, it had a more profound effect on patients with a history of opioid use.

Elective ARCR leads to a high rate of opioid dependence. Our study found that 18.6% of patients became opioid dependent, receiving ≥6 opioid prescriptions, following surgery. This was not limited to patients taking opioids preoperatively, as 9.8% of opioid-naive patients became dependent. This surprisingly high number is similar to the findings of other studies. Leroux et al[7] retrospectively reviewed a database of 79,287 opioid-naive patients undergoing elective shoulder surgery. Their study found that 1 in 7 patients (14%) continued to consume opioids 180 days following surgery. Gil et al[5] investigated opioid-naive patients undergoing ARCR and found that in 8.3% of patients, prolonged use of opioids developed following shoulder arthroscopy. Martin et al[11] showed that patients taking opioids for ≥12 weeks after surgery have a 50% chance of continuing to use opioids 5 years later. These findings confirm that elective orthopedic surgery is a contributing factor to the opioid epidemic and that orthopedic surgeons must take an active role in the solution.

Our study offers one method orthopedic surgeons can effectively use to reduce opioid consumption and dependence following ARCR. A review of the literature on the effect of preoperative opioid education has shown a positive impact on opioid reduction. Syed et al[19] evaluated the effect of preoperative education on opioid consumption in patients undergoing ARCR and revealed that preoperative opioid education was associated with a decrease in opioid consumption by 30.8 tablets at 3-month follow-up. Farley

Table IV Multiple-comparison test of 2-year postoperative average SANE score and VAS pain score among subcategorized cohorts

	Study cohort with prior opioid use	Study cohort without prior opioid use	Control cohort with prior opioid use	Control cohort without prior opioid use	Overall *P* value
SANE score	74.8	83.1	68.2	90.1	.011
VAS pain score	1.58	1.51	3.44	1.08	.011

SANE, Single Assessment Numeric Evaluation; *VAS*, visual analog scale.
Continuous data are presented as mean for parametric data, with independent *t* tests conducted to calculate *P* values for a means of comparison. Significance was set at $P < .05$.

et al[4] assessed whether preoperative opioid education would reduce the number of opioids taken postoperatively. The results of their study revealed that patients receiving 30 tablets and preoperative education consumed a mean of 12.4 tablets whereas those receiving 30 tablets and no preoperative education consumed a mean of 15.6 tablets ($P = .02$). Additionally, patients receiving education took opioids for significantly fewer postoperative days (4.5 days vs. 3.5 days, $P = .02$). Stepan et al[18] reported on the effect of hospital-wide opioid education and subsequent institution of postoperative opioid guidelines on opioid-prescribing practices after ambulatory surgery. The pre-institutional guideline cohort consumed an average of 43.9 ± 12.9 opioid pills, whereas the post-institutional guideline cohort consumed an average of 38.3 ± 9.7 opioid pills. The number of pills prescribed after shoulder arthroscopy showed a significant decrease ($P < .001$) when comparing the 2 groups. Therefore, we recommend that orthopedic surgeons incorporate a routine opioid education program prior to elective surgical procedures.

It has previously been reported in the literature that preoperative opioid use leads to increased opioid consumption and dependence following surgery; we also confirmed this. Westermann et al[20] conducted a large study involving >35,000 patients and found that those who had filled opioid prescriptions within 3 months prior to ARCR were 7.45 times more likely to fill opioid prescriptions 3 months following surgery. Their study determined that among all risk factors identified, a history of opioid use was the best predictor of continued opioid use and/or dependence. In a prospective study evaluating opioid consumption following ARCR, a multivariate regression analysis showed that preoperative opioid use was the most important predictor of opioid use following surgery.[19] One surprising benefit of preoperative opioid education was the substantial positive effect it had on patients who were using opioids preoperatively. When patients who were taking opioids prior to surgery were evaluated, those who received education took fewer MMEs and had greater SANE scores than those in the control group.

Our study was limited by the following factors: First, the prescription-monitoring program only identifies prescriptions that are filled and does not identify elicit use. Therefore, it fails to capture those patients who are abusing opioids. Second, although 21% of patients did report additional surgical procedures after ARCR, we are not able to determine the reason patients were given additional prescriptions, which may have been because of other injuries or diseases. An area of opportunity for prescription-monitoring programs would be to list the diagnosis associated with all opioid prescriptions. Third, patient history of legitimate opioid use vs. opioid abuse was not determined in this study. Therefore, in patients with reported prior opioid use, we cannot ascertain whether this represents acute prior postoperative use or a history of opioid addiction. Finally, among patients who completed surveys, fewer patients reported daily opioid use than were found to have been prescribed opioid pain medications in the prescription-monitoring program. This discrepancy may be multifactorial, including patients inaccurately reporting their opioid use habits, patients not using medications as directed, and patients volitionally discontinuing use of medications.

Conclusion

The findings of this study, along with a review of the literature, reveal a high rate of opioid dependence following elective shoulder surgery. The results of this randomized controlled trial support our hypothesis that orthopedic surgeons can substantially reduce postoperative opioid consumption and dependence by incorporating a standard preoperative opioid education program. Explaining the risks of opioids to patients and involving them in the pain management process, including the decision to use opioids, can result in a substantial reduction in opioid use and, thus, dependence.

Disclaimer

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Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jse.2020.04.036.

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